Brace for impact! A thesis on medical care following an airplane crash
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Citation for published version (APA):

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Chapter 1

General introduction and aims of the thesis
At 10:26 am, on February 25, 2009, a Boeing 737-800 crashed 1.5 km from the runway of Amsterdam Schiphol Airport. Because of the proximity of the motorway reports of the crash were almost instantaneous and photos and videos made by bystanders were displayed on the internet and television in several countries. While the media was busy covering the crash, telephone communication at the regional emergency services centre was overloaded. The news reached some hospitals quicker through the media and by word of mouth than through the official channels. Nine people died, and 120 were injured.

Everybody can remember major disasters like the 2004 Madrid bombing, Hurricane Katrina in 2005, or the Japanese earthquake and tsunami in 2011. But besides these disasters, large scale accidents with multiple casualties happen more often. In 2013 at least 9 major railway accidents occurred in Europe, with 6 to as many as 200 injuries at a time. (1) The World Health Organization regional office for Europe reported 636 major (man-made) accidents from 1990-2012; either industrial or transport accidents. In these accidents 17,910 people died and they affected 105,865 people. (2) Since 2000, the Netherlands has had an average of 13 major incidents (involving ≥10 injured casualties) a year, with a peak of 19 accidents in 2003 and a peak of 945 people injured and 21 deaths in one incident in 2001. (3) In the Netherlands, multiple or mass casualty incidents (MCIs) happen on a monthly basis.

Airplane crashes are somewhat rare, but the number of flights and air travellers has increased rapidly since the start of commercial air traffic. Also, the size of the aircraft, and therefore the number of passengers on board, has increased to meet the growing demand for air travel. After a steady decrease in the number of fatal air accidents up to the 1970’s, the accident rate continues to decline, but at a much slower rate. (4) Between 2002 and 2011 airplane crashes of commercial airliners happened at a worldwide average of 2.5 accidents per year in which at least one person was fatally injured. (5; 6) A common misconception is that airplane crashes are unsurvivable. On the contrary, most (73%) serious transport category airplane accidents are survivable, in which 76% of the occupants survives, according to a study by the National Transportation Safety Board (NTSB) that examined accidents in the period 1983 – 2000. (7)

In administrative and scientific terminology, two levels of major accidents have been identified; Mass Casualty Incidents (MCIs) and Disasters. MCIs are incidents/accidents with multiple casualties, the number of which is not explicitly defined; however the number must be more than is expected to be managed by the daily
available infrastructure and logistics. The term ‘disaster’ can be explained in a variety of ways. From a medical management point of view, an MCI becomes a disaster when the number of casualties is so large that even when extra capacity is deployed by activating disaster protocols, normal standards of care cannot be met. In a highly developed society with high standards of medical care, people are entitled to high standards of care in any situation. Medical managers and practitioners should all have this goal, otherwise we allow casualties of an MCI or disaster to become victims twice.

Since these MCIs do not happen on a daily basis, there is hardly any routine in managing them. Therefore it is important to study these events, and break them down into areas applicable to MCIs or disasters of different origins. The concept of triage or patient distribution is the same whether it is an airplane crash, major explosion or collapse of a highway fly-over. The infrastructure and logistics of a hospital, and the basis of its disaster protocols remain applicable whether there are casualties with major burns or blast injuries to take care of. In times of stress and high workload, protocols and agreements must be clear. In the management of an MCI or disaster this is especially important.

After the airplane crash of February 25, 2009, medical professionals at several hospitals realised the impact of the airplane crash and the need to research this MCI. The trauma/surgical department of the four hospitals that received the most casualties decided to analyse this tragic incident, and together study the events in order to learn from it. The MOTAC study group was established. MOTAC is the acronym for the Dutch “Medisch Onderzoek Turkish Airlines Crash”, which translates to Medical Research of the Turkish Airlines Crash. The crash was called the ‘Polder Crash’ in the media, because the airplane crashed in a ploughed field, in a polder.

In this thesis the events and management of an MCI of an airplane crash are studied from a medical point of view. The incident is broken down into areas that are applicable to other MCIs. It is believed that the detailed study of an exceptional event can provide vital information for many other kinds of exceptional events. This thesis is presented in 4 parts. The first part describes the outline of the thesis and the general events that happened on February 25 2009. The rough data gathered in chapter 2 are the basis of the following studies.

In the 2nd part of this thesis, the pre-hospital management of this specific crash, and MCIs in general, are studied. Chapter 3 and 4 concern the triage and distribution of
the casualties to hospitals. Difficulties in these processes are identified. In chapter 5 and 6 a proposal is laid down for determining hospitals’ critical care capacity and designing specified patient distribution protocols for MCI’s in high risk areas, based on the lessons learned from, among other incidents, the February 2009 crash.

The 3rd part deals with the in-hospital management of the casualties of the crash. In chapter 7 the radiological work-up that the casualties of the crash received and the appliance of ATLS protocol is studied and discussed. Chapter 8 focuses on the spinal fractures which many of the patients suffered in this crash. This type of injury is quite common in airplane accidents. Chapter 9 outlines the problems physicians face when diagnosing all injuries in the patients, immediately after the accident, especially when multiple patients have to be evaluated in a short period of time. The incidence of delayed diagnosis of injury is studied.

The last part, part 4, concerns the aftermath of an MCI. In chapter 10 several injuries sustained in the crash are studied from a biomechanical point of view. The question: How did the structure of the aircraft and the forces applied to it, contribute to the injuries, and what can be done to prevent or mitigate them in future accidents? Is asked. After the physical injuries have healed, mental scars may remain. Chapter 11 determines the mental health issues survivors of a crash have to deal with months or years after the incident. The final chapter, chapter 12, is a reflection on the lessons to be learned from this crash and how they can be applied to future incidents.
References


